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**Original Article**

# Evaluation of apical microleakage-using new polydimethylsiloxane-gutta percha based material: An invitro study

Rachit Walia[a,*], Suhail Manzoor[b], S. Datta Prasad[c], Sarang Sharma[d]

## ABSTRACT

***Objective:*** The purpose of this study was to evaluate the apical micro leakage of *Gutta Flow system* as a sealer and complete obturating material and compare it with cold obturation technique using stereomicroscope.

***Methods:*** 45 freshly extracted single rooted premolar teeth were collected and sectioned at the CEJ. The teeth were randomly divided into groups of 15 each and obturated as follows. GROUP A : Canals were obturated with Gutta Flow as obturating material. GROUP B : Canals were obturated with gutta percha cones and Gutta Flow as sealer. GROUP C: Canals were obturated with gutta percha cones and zinc oxide eugenol as sealer.
Longitudinal sections of each specimen were done & methlylene blue dye penetration was evaluated to measure microleakage-using stereomicroscope.

***Results:*** The data was analyzed using *Unpaired 't' test* and *Anova* at 5% level of significance, showing *significant differences among the 3 groups ($p < 0.05$)*.

***Conclusion:*** Group B showed least leakage followed by Group A. Group C showed maximum leakage.



***Keywords:*** *Dye penetration, Gutta flow, Obturation, Sealer*

## INTRODUCTION

Endodontic therapy essentially is directed towards one specific set of aims: to cure or prevent periradicular periodontitis.

It is generally accepted that gutta percha cones with sealer is one of the most reliable methods for filling of the root canal system. Sealer provides lubrication, fills in the discrepancies between the filling material and the dentinal walls, and provides radiopacity, antibacterial and germicidal properties.[1]

A polydimethylsiloxane-based root canal sealer has been introduced which is a modification of earlier sealer named RoekoSeal automix, a silicon based material. RoekoSeal has been improved by adding nanosilver particles and powdered gutta percha as fillers into new material, named GUTTA FLOW (Coltene/Whaledent, Germany) which claims to have better seal and good adaptability because of the fact that this material expands slightly on setting.[2]

The purpose of this study was to evaluate the apical micro leakage of Gutta Flow system when used as a sealer and as a complete obturating material and to compare it with the commonly used lateral obturation technique using zinc-oxide eugenol as sealer.

## MATERIALS AND METHOD

### Sample selection

Forty five single rooted premolar teeth were used for the study. To facilitate the instrumentation, crown portion of

[a] Assistant Professor, [d] Professor & Head, Department of Conservative Dentistry & Endodontics, Krishna Dental College, Ghaziabad, U.P., [b] Associate Professor, [c] Professor & Head, Department of Conservative Dentistry & Endodontics, Subharti Dental College, Merrut, U.P., India.
[*] Corresponding author. 67, Second floor, Vivekanand Puri Sarai Rohilla, Delhi 110007, India. Tel.: +91 09910840897; fax: +91 011 23694393, *email: drrachitwalia@rediffmail.com*
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each tooth was sectioned at the CEJ using a diamond disc (0.2 mm, Microdent Technology, Germany).

## Chemo mechanical preparation

Root canal therapy was carried out following standard procedures using K-type files in the Step Back technique. The working length was determined and the canal prepared apically upto 45 K-file size which was selected as master apical instrument. Coronal preparation was done upto 70 K-file size using Step Back technique. 3% sodium hypochlorite was used as an irrigating solution.

## Distribution of the groups

The roots were randomly divided into three experimental groups of 15 roots each.

GROUP A: Canals obturated with Gutta Flow as complete obturating material.

GROUP B: Canals obturated with lateral compaction technique using Gutta Flow as sealer.

GROUP C: Canals obturated with lateral compaction technique using ZOE as a sealer.

## Obturation procedure

### *Group A*

Gutta flow was provided in double barrel automix system with a gun, disposable tips and capsules. The capsule was opened and vibrated in amalgamator for 30 s according to manufacturer's instructions. The capsule was then attached to the gun and its tip inserted into the root canal. Filling material was introduced into the canal by taking the tip slowly out of the canal to fill the entire canal.

### *Group B*

An ISO size 45 master gutta percha cone was inserted into the root canal to the working length to check the tug back. Gutta Flow was mixed as in Group A and some Gutta Flow was taken on a glass slab to coat the master cone. Master cone was inserted into canals and lateral compaction performed.

### *Group C*

An ISO size 45 master gutta percha cone was inserted into the root canal to the working length to check the tug back. A zinc oxide eugenol sealer was mixed according to manufacturer's instruction on the glass slab and applied to the canals with the help of lentulo spiral. Master cone was coated with sealer and placed in the canals and lateral compaction performed.

### *Coronal seal*

Access cavity was sealed with glass ionomer cement in all the groups and post obturation radiographs were taken.

## Storage of samples

The samples were kept in separate cylindrical tubes having wet cotton pellet to create 100% humidity and stored at 37 °C in incubator for 1 week.

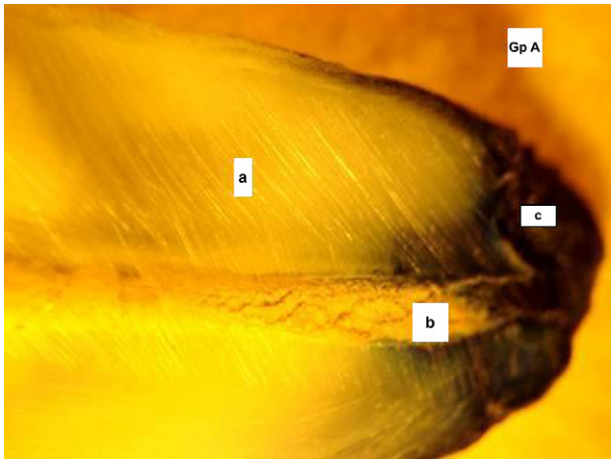
After 1 week, two layers of nail varnish were applied to the root surfaces except the area surrounding the apical foramen. All the samples were immersed in 2% Methylene Blue solution (GlaxoSmithKline Pharmaceuticals, Mumbai) in individual glass vials and all glass vials placed in an incubator at 37 °C for 1 week.

After 1 week, samples were removed from the Methylene Blue solution and washed under running water to remove excess dye. The samples were then dried and nail varnish coating was removed with hand scaler.

## Sectioning of samples and evaluation

Samples were sectioned with diamond disc labio-lingually. Dye penetration of each section was evaluated using Stereomicroscope at 10× magnification. Dye penetration was measured from the apex to the most coronal extent of the dye visible on the filling material or root canal walls, and scoring was made as follows (Figs. 1–3):

Score 0 no leakage detected
Score 1 leakage $< 0.5$ mm
Score 2 leakage between 0.5 and 1 mm
Score 3 leakage $> 1$ mm




**Figs. 1–3** Sealing ability and difference in degree of apical microleakage as seen under stereomicroscope after 7 days of dye penetration (c) along the tooth (root dentin, a) restoration (root filling, b) interface for Group A (Canals obturated with Gutta Flow as obturating material), Group B (Canals obturated with gutta percha cones and Gutta Flow as sealer) and Group C (Canals obturated with gutta percha cones and zinc oxide eugenol as sealer) respectively.